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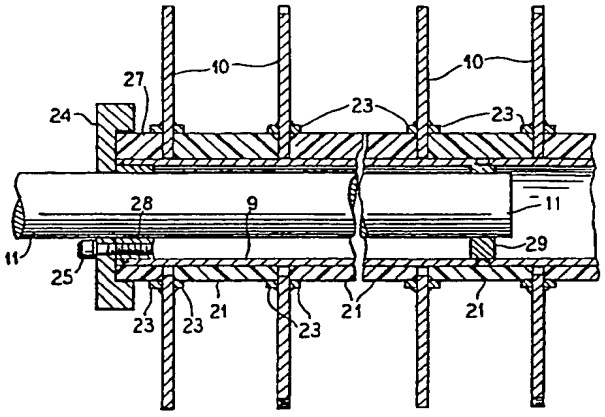
(54) **Prevention of wedged jamming in disk screens.**

(57) A disk screen especially adapted for scalping hog fuel and the like has the interdigitated disks (10) of the screening bed mounted on their shafts (9) in a manner to permit adjacent interdigitated disks (19) to deflect relatively when a migrant particle tends to engage wedgingly between the interdigitated disks (10) so that the migrant particle will be prevented from jamming the engaged disks (10) but will be cleared therefrom automatically in the continuing rotation of the disks (10). Resiliently yieldable elastomeric spacers (21) maintain the disks (10) in predetermined spaced relation to permit the relative deflection of the disks (10).



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add material such as slivers, trim ends, rocks, etc. The through flow, or as sometimes referred to underflow, of the disk bed of the screen, free from slivers, sticks, trim ends, rocks, and the like, is in most cases the desired hog fuel product. On the other hand, the through flow may represent the rejects and the overflow, or oversize material may be transferred to process or rechipping, hogging or fractionating, depending on the type of material and its end use.

Among the screenings which should be removed from the hog fuel mass, bits of rock and tramp metal may be present, and where these are of a size approximating the screening disk gaps but not quite small enough to pass through readily, there is often the tendency for such particles, which may be referred to as migrant particles, to become wedged between adjacent interdigitated disks of the screen bed and jam the same, causing stoppage of the screen, and often serious damage. The proclivity toward such jamming and damage in prior disk screens as represented for example, by the beforementioned U.S. patents will be apparent because the screen disks are rigidly held in axially spaced relation along their shafts. In addition, the disks themselves for the intended hog fuel screening uses are generally of a rugged, rigid, steel structure. Each disk may be about 9 mm thick and about 432 mm in overall diameter. There may be eleven disks spaced apart bout 102-6 mm on each alternate shaft and twelve disks similarly spaced on the other shafts, with the disks of adjacent shafts interdigitated and the spacing between the interdigitated disks being about 25-5 mm . Any particles smaller than such interdigitated disk spacing will fall through as the material is advanced across the screening bed, and larger particles will be moved on. Some particles may be of such an intermediate size or irregular shape that there is a tendency to jam between interdigitated disks. For example, uneven particles such as rocks or tramp metal, or even some wood particles which may be partially smaller than the between the disk spaces and in

detail view taken substantially along the line IV-IV in Fig. 3.

As schematically shown in Fig. 1, a disk screen apparatus 5 of the kind with which the present invention is concerned comprises a frame 7 supporting a screening bed 8 having a series of corotating equally spaced parallel shafts 9 of generally similar coextensive length and each of which has thereon a longitudinal series of equally spaced concentric screen disks 10 which interdigitate, as best seen in Fig. 2, with the screen disks of the adjacent shafts. To attain the proper disk interdigitation, there is a differential number of the disks 10 on the alternate shafts 9, such as eleven disks alternating with twelve disks. In a typical arrangement of the disk screen apparatus 5, wherein the disks are of dimensions such as described hereinbefore , the screen bed 8 may comprise twelve of the shafts 9 carrying, in the aggregate, 138 of the disks 10. The shafts 9 are preferably hollow tubular and of noncircular cross section (Figs. 3 and 4) and provided with respective stub shafts 11 at their opposite ends which are suitably journaled on the frame 7.

Means are provided, as is customary, for driving the shafts 9 and thereby the disks 10 in unison in the same direction, clockwise as seen in Fig. 1, part of the drive means being identified at 13.

Material such as hog fuel to be screened is delivered to the infeed end of the screening bed 8 by means of a chute 14. The arrangement may be such that desirable size particles of the material drop down through the screen bed 8 and are received in a hopper 15 for disposition while oversize and odd shaped particles are carried on the screening bed 8 toward the discharge end of the bed. Those particles which are advanced by the screen bed 8 to its discharge end are discharged to an outfeed chute 17, as indicated by directional arrow.

For hog fuel screening the disks 10 are

molded with respective central passthrough openings 22 which are complementary to closely fit the perimeter of the associated shaft 9 in corotatively keyed relation. All of the spacers 21 are of equal length. On their outer perimeters, the spacers 21 may be cylindrical and of a diameter, at least at their ends, equal to the inside diameter of annular mounting shoulders provided by concentric annular rings 23 attached as by means of welding to the respective opposite faces of each of the disks 10 adjacent to and about the central clearance holes 19 in the disks. By having the central openings 19 in the disks slightly oversize relative to the perimeter of the associated shaft 9, the shoulder rings 23 are adapted to support the disks 10 in uniformly loosely spaced relation to the associated shaft. By their resilient stiffness, the spacers 21 will normally maintain the disks 10 in substantially accurate spaced parallel relation. However, when a migrant particle MP such as a rock or other tramp material such as metal tends to wedge between adjacent interdigitated disks 10, the resilient spacers 21 are adapted to yield as the disks are deflected and permit the particle MP to be automatically cleared to move onward or pass through the screen in the continuing rotation of the disks in the screen bed.

At the opposite ends of the shafts 9, the series of spacers is placed under endwise axial inward snug-up compression by means of retainer plates 24 received slidably about the outwardly projecting portions of the respective stub shafts 11 and drawn up by means of bolts 25 against the outer ends of respective adaptor spacers 27 of similar construction as the spacers 21. Conveniently the bolts 25 are threaded into an associated outer filler or spacer plate 28 which may be welded to and project a short distance outwardly from the adjacent end of the shaft 9 to serve as a stop to avoid overcompressing the series of spacers 21,27 which are placed under endwise thrusting compression by the retainer plate 24 in each instance.

CLAIMS:

1. In a disk screen apparatus comprising a screening bed having a series of corotating spaced parallel elongate shafts each of which has thereon a longitudinal series of concentric screen disks which interdigitate in axially spaced relation with companion screen disks on the adjacent shafts, said screening bed being adapted to screen from particulate material particles which are oversize relative to the axial screening space between interdigitated disks:

resiliently yieldable means for normally maintaining said disks in generally parallel screening relation to one another on said shafts;

said means permitting adjacent interdigitated disks to deflect relatively when a migrant particle tends to engage wedgingly between the interdigitated disks, so that themigrant particle will be prevented from jamming the engaged disks but will be cleared therefrom automatically in the continuing rotation of the disks.

2. Apparatus according to claim 1, wherein said means comprise spacers maintaining said disks in predetermined spaced relation along the respective shafts.

3. Apparatus according to claim 2, wherein said shafts are of non-circular cross section, and said spacers comprise molded units having openings therethrough complementary to the cross section of the shafts.

4. Apparatus according to claim 3, wherein the spacers have cylinrical annular perimeters at least at their opposite ends, and said disks have annular shoulders engaging said perimeters whereby the disks are maintained concentric relative to said spacers.

5. Apparatus according to claim 4, wherein the disks have central apertures loosely related to their shafts.

6. Apparatus according to claim 1, wherein said resiliently yieldable means comprise elastomeric spacers.

opposite ends, and said disks have annular shoulders engaging said spacer perimeters whereby the disks are maintained concentric relative to said spacers.

13. Shaft means according to claim 12, wherein the disks have central apertures loosely related to the shaft perimeter.

14. Shaft means according to claim 9, wherein said resiliently yieldable means comprise elastomeric spacers.

15. Shaft means according to claim 14, wherein said elastomeric spacers comprise solid polyurethane having 70^{o} Shore hardness.

16. Shaft means according to claim 9, wherein said disks are loosely mounted on their shaft perimeter, said resiliently yieldable means comprising spacers maintaining predetermined spaced relation between said disks, and means applying longitudinal snug-up pressure to the spacers.

17. An elongate shaft assembly adapted for use in a disk screen apparatus wherein a screening bed has a series of such shaft assemblies corotatable to advance material along the bed from one end to the other end, said shaft assembly having :

a shaft with a longitudinal series of concentric screen disks loosely mounted thereon and which disks are adapted for cooperating in interdigitated screening relation with the similar disks on adjacent shafts in the screening bed;

resiliently yieldable combination spacer and mounting means for engaging said disks and maintaining them in predetermined spaced relation to one another and to said shaft;

and shoulder means on said disks engaging said combination spacer and mounting means.

18. A shaft assembly according to claim 17, wherein said combination spacer and mounting means comprise molded elastomeric members, and said members and said shaft having means keying the members corotatively with the shaft.

FIG. 1

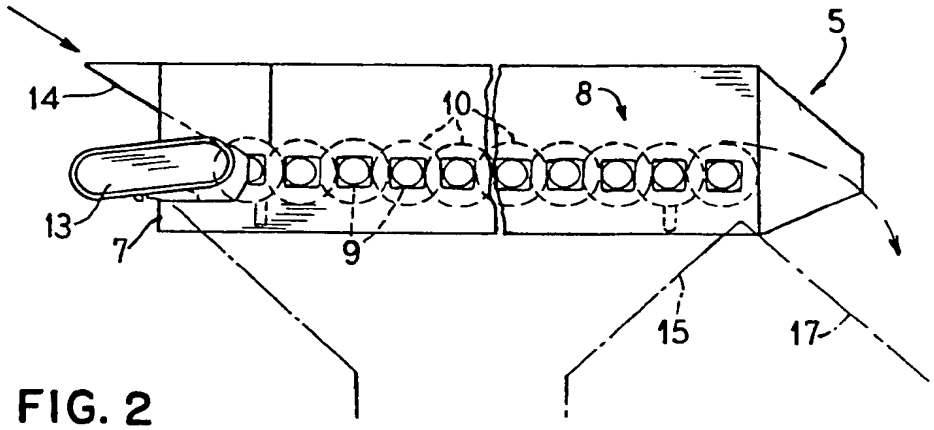

FIG. 2